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FUTURE WAR PAPER

Communications and Intelligence Support for Unmanned Aircraft Systems in 2020: A Looming Hollow Force?

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INTRODUCTION

> *The success of UAVs in recent conflicts represents a historic opportunity to exploit the transformational capabilities inherent in UAVs/UCAVs. The benefits and promise offered by UAVs…have captured the attention of senior military and civilian officials in the Defense Department, members of Congress and the public alike. Indeed, these recent combat operations appear to indicate that unmanned air systems have at last come of age.*
>
> *DoD Defense Science Board*[1]

The age of the unmanned aircraft (UA) has arrived.[2] Given their tremendous success in supporting combat operations in Iraq and Afghanistan, UAs are no longer a novelty item within the Department of Defense (DoD). As most DoD "insiders" will attest, the true indicator of a program's success is its funding level. If that is true, UAs are very successful and what one United States Air Force (USAF) general officer called a "growth industry." Research and development funding alone has increased on the order of 700 percent.[3] USAF General William T. Hobbins believes the tremendous growth of Unmanned Aircraft Systems (UAS) is attributable to the increasing number of missions, many of them nontraditional, UAs are capable of accomplishing. Beyond traditional intelligence, reconnaissance and surveillance (ISR) missions are missions such as digital mapping and day/night strike. "Certainly in the future of unmanned aircraft systems, there are more missions out there; we just haven't figured them out yet."[4] By

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[1] Department of Defense, *Unmanned Aerial Vehicles and Uninhabited Combat Aerial Vehicles*, Defense Science Board Study (DSB) (Washington DC: Department of Defense, February 2004), cover letter.
[2] This paper utilizes the latest terminology as delineated in the Department of Defense's *Unmanned Aerial Systems Roadmap*. Unmanned Aircraft (UA) are the flying component of Unmanned Aircraft Systems (UAS).
[3] Office of Management & Budget, "Department of Defense," http://www.whitehouse.gov/omb/budget/fy2005/defense.html.
[4] Elizabeth Culbertson, "Unmanned Aircraft Key to Future Operations, General Says," American Forces Press Service, 20 October 2006, http://www.defenselink.mil/News/NewsArticle.aspx?id=1730.

2020, the DoD is estimating that these future missions will include such complex tasks as aerial refueling and suppression of enemy air defenses (SEAD).[5]

In the rush to embrace this new capability, defense officials must ask a key question. Is the DoD (and more specifically are the individual services) truly prepared to support the dramatic increase in UA operations? An examination of DoD and service UAS acquisition plans reveals that there are two areas, if not appropriately addressed, that will ultimately result in a degradation, not an increase, in future UAS capabilities to support the warfighter. These areas are intelligence analysis and communications infrastructure. If the DoD does not include in its ambitious acquisition plans commensurate improvements and or increases in intelligence support dedicated to the information collected by UAs, as well as the communications architecture required to operate these systems, the UA force in 2020 may very well be a hollow one.

ASSUMPTIONS / DEFINITIONS

It is necessary to define what is meant by the term Unmanned Aircraft. According to the DoD, an unmanned aerial vehicle is

> A powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload. Ballistic or semiballistic vehicles, cruise missiles, and artillery projectiles are not considered unmanned aerial vehicles.[6]

While it is easy to focus on the UA, it is critical to emphasize that UAs are but one piece of a system. In order to fully integrate UAs into the joint environment, it is necessary to consider the

[5] Department of Defense, *Unmanned Aircraft Systems Roadmap: 2005-2030* (Washington DC: Department of Defense, August 2005), 74.
[6] UAS Roadmap, 1.

sensors, the control stations, the launch and recovery elements and their interoperability with other systems.[7]

The DSB Study has classified UASs into three categories – small, medium and large. Space constraints forced this paper to focus primarily on medium and large UASs. Yet it is imperative for the reader to understand that small and micro UAs are one of the fastest growing segments of the UAS environment and their fielding requires significant integration planning.

It must be emphasized that just like any other aircraft, capability is not measured merely in terms of numbers. Just because the DoD possesses X number of UAs that does not mean these aircraft are all able to fly at the same time. When UAs are purchased, there is typically not a corresponding number of control stations purchased.[8] UA operations are typically described in terms of "orbits" (unofficial word from the Air Staff is that the USAF Chief of Staff has directed that the term "orbits" be dropped and replaced with "caps"). One orbit/cap is a UA being operated by an associated ground station.

CURRENT / FUTURE SYSTEMS

> *…unmanned aircraft have transformed the current battlespace with innovative tactics, techniques and procedures.*
>
> *DoD UAS Roadmap*[9]

There are currently nine medium and large UA programs either in operational service or development within the DoD (this number does not include the unmanned combat aerial vehicles or UCAVs). This equates to approximately 250 UAS in service in 2005; this number is expected

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[7] House Armed Services Committee, Subcommittee on Tactical Air and Land Forces, *Unmanned Aerial Vehicles*, statement of Maj Gen Stanley Gorenc, 6 April 2006, www.house.gov/hasc/4-6-06GorencTestimony.pdf.

[8] For example, in 2005 the USAF announced it was purchasing 144 more Predator UAs. That purchase included only 36 support packages (control stations, satellite terminals, etc.)

[9] UAS Roadmap, cover letter.

to grow to 675 by 2010 and 1400 by 2015.[10] Four of the most commonly used UAS are highlighted below.

MQ-1 *Predator*: Built by General Atomics for the USAF, the MQ-1 began as an Advanced Concept Technology Demonstrator in 1994. Originally designated the RQ-1, it demonstrated the ability to employ Hellfire missiles in 2001 and was designated the MQ-1 (multi-mission capable). It operates primarily in a Beyond Line of Sight (BLOS) mode and can stay airborne for approximately 14 hours (when carrying external stores).[11] The follow-on to the Predator is the MQ-9 *Reaper* (originally designated the Predator B). The Reaper can fly higher, faster, farther and with more stores than the Predator, and its primary mission is as a "persistent hunter-killer for critical time sensitive targets."[12]

RQ-2B *Pioneer*: Initially built by Pioneer UAV, Inc. for the US Navy, it first deployed in 1986. It can fly for approximately five hours with a 75 pound sensor payload. It is currently employed by the US Marine Corps (USMC) in a reconnaissance and surveillance role, providing imagery intelligence to the tactical commander. It is limited to Line of Sight operations (LOS).[13]

RQ-4 *Global Hawk*: Built by Northrop Grumman for the US Air Force as a high-altitude long endurance UA. It carries both an electro-optical/infrared (EO/IR) sensor and a Synthetic Aperture Radar (SAR), with other sensors planned as the fleet of 51 aircraft is produced.[14] The US Navy is currently testing the aircraft for possible future maritime operations. The Global Hawk operates in a BLOS mode.

RQ-7A/B *Shadow 200*: Built by AAI for the US Army (USA) to meet its Brigade-level UA requirement for support to the maneuver commander. The US Army plans to procure 332 UA. It has an EO/IR sensor that can provide real-time video. It is currently planned to operate in a LOS mode.

The above UAS are but a small part of the planned DoD UA inventory. By 2010, the DoD envisions 14 different systems in the force structure, performing a variety of missions. It is not just the DoD that is aggressively pursuing UAS capabilities; in the FY 2001 National Defense Authorization Act, Congress established the goal of having, by 2010, one-third of the USAF's deep-strike capability be provided by UAs.[15] The USAF has gone even further, having set as its

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[10] Ibid., 37.
[11] Ibid., 4.
[12] Ibid., 10.
[13] Ibid., 5.
[14] Ibid., 6.
[15] GAO, *UAV: Major Management Issues Facing DoD's Development and Fielding Efforts*, GAO-04-530T, (Washington DC: 17 March 2004), 3.

goal that 45% of its future long range strike force be unmanned.[16] On a broad scale, the DoD envisions an expanding mission portfolio for UAS in the next 15 years, to include aerial refueling, SEAD, and penetrating strike.[17]

The rapid development of UAS brings with it many increased capabilities, but also many questions. Is the DoD prepared to fully integrate UAS operations with the joint combat operations architecture? It can be argued that the DoD does not need 14 major systems of record and that with joint cooperation efficiencies in not only procurement but capability could be realized. However, obtaining joint cooperation is very often much easier said than done. USAF General Ronald Keys, commander of Air Combat Command believes that DoD needs to name a lead agency to ensure that the services are more efficient and effective in acquiring and operating UAS. This executive agent would

> rationalize what medium- and high-altitude UAVs each service will possess and coordinate the timing of their production and fielding and how they will communicate and operate in the airspace to avoid frequency interference and collisions with manned aircraft and other UAVs. We have got a lot of UAVs downrange and, in some cases, we are actually competing production against each other. The requirements are not the same, the datalinks are not the same, some of the sensors are not the same. And in some cases, there is a good reason for a sensor to be different. In some cases, there is no good reason.[18]

Currently the other services are against an executive agent for UAS. The head of US Army aviation in the Chief of Staff's office, Brigadier General Stephen Mundt, sees this as a roles and missions issue. "What [the Air Force] is saying is they want to be the executive agent and they

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[16] Department of Defense, *Quadrennial Defense Review Report* (Washington DC: Department of Defense, 6 February 2006), 46.
[17] *UAS Roadmap*, 74.
[18] Ann Roosevelt, "Army 'Absolutely' Disagrees With Air Force as Executive Agent for Most UAVs," *Defense Daily*, 27 March 2007, http://aimpoints.hq.af.mil/display.cfm?id=17610, (accessed 27 March 2007).

will fly it, they will control it and I will compete for it. That is ownership."[19] This disconnect goes beyond mere service competition and is evident when one examines what the DoD envisions as its desired capability and the actions taken to ensure that this capability is fully integrated into the force structure and supportive of its primary customer, the combatant commanders. The Defense Science Board stated in a 2004 study that the "single most important recommendation is to accelerate the introduction of UAVs into the force structure."[20] Yet in that same year the General Accounting Office (GAO) cautioned that

> Neither the Roadmap nor other DOD guidance documents represent a comprehensive strategy to guide the development and fielding of UAVs that complement each other, perform the range of missions needed, and avoid duplication.[21]

The DoD is clamoring for more rapid integration of UAS into the force structure, but yet does not have a comprehensive plan for this integration. This integration is particularly lacking in inclusive strategies for intelligence and communications infrastructure support to UAS operations.

INTELLIGENCE SUPPORT

> *The information from (UASs) could, and I contend, should populate the global information grid, to the maximum extent possible. Systems of systems can provide the appropriate information at the right time to those who need it. This would correspond to improved situational awareness at all levels of warfare…It's about decision superiority.*
>
> *General William T. Hobbins*[22]

The modern UAV came to existence in an attempt to provide an increased ISR capability. The first "operationally significant" USAF UA was the *Lightning Bug* which performed tactical

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[19] Ibid.
[20] DSB Study, cover letter.
[21] GAO, *Major Management Issues*, 8.
[22] Culbertson.

reconnaissance in the Vietnam War.[23] As a result of Israel's success employing UAs in the Bekka Valley in 1982, the US military reexamined the role UAs could play. The US Navy purchased two *Pioneer* systems in 1985 to conduct "over-the-horizon targeting, reconnaissance and battle damage assessment." The first operational deployment occurred in December 1986 with the battleship USS Iowa.[24] The *Pioneer* was very successfully employed in Operation DESERT STORM and since that time the use of UAs in the ISR role rose exponentially.

However, intelligence support for UAS operations, just like communications support, is facing a crisis. All users want more intelligence, but it appears that little thought is being given to how that information will be analyzed. A UA flying over a segment of enemy territory and sending back a video stream to a ground station does not necessarily mean that it is sending back intelligence. Joint Publication 3-55, while no longer an active document, provides an excellent explanation of this concept

> Reconnaissance, surveillance and target acquisition operations do not always collect intelligence; rather, they collect data that becomes intelligence after it is processed, evaluated, and integrated with other pieces of information and data (fused).[25]

The DoD, in order to better support the warfighter during the current long war, a war that the Quadrennial Defense Review (QDR) calls irregular, has advocated a dramatic increase in intelligence capability. The QDR called for

1. Increased measurement and signature intelligence (MASINT) capabilities to identify enemy WMD and their delivery systems, and to support other applications.
2. Expand signals intelligence (SIGINT) collection with sufficient revisit rate and geo-location capabilities for military operations.
3. Increase investment in unmanned aerial vehicles to provide more flexible capabilities to identify and track moving targets in denied areas.

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[23] USAF, *The USAF RPA and UAV Strategic Vision*, (Washington DC: 2005), 1.
[24] US Navy, Factfile: RQ-2A *Pioneer* Unmanned Aerial Vehicle, http://www.navy.mil/navydata/fact_display.asp?cid=1100&tid=2100&ct=1.
[25] JP 3-55, RSTA Support for Joint Operations, 14 April 1993, accessed via http://www.fas.org/irp/doddir/dod/jp3-55/index.html, II-1.

4. Implement a new imagery intelligence approach focused on achieving persistent collection capabilities in cooperation with the Director of National Intelligence. Investments in moving target indicator and synthetic aperture radar capabilities, including Space Radar, will grow to provide a highly persistent capability to identify and track moving ground targets in denied areas.[26]

The QDR stated that to support this effort the DoD "has increased the number of intelligence professionals working in collection and analytical disciplines to support growth in homeland defense and war on terror missions."[27] Yet many of these professionals will be working in areas outside of UAS support. The vast majority of the intelligence capability recommended above will come from the USAF.

At this point it is unclear if the USAF has enough intelligence personnel to properly collate, analyze and disseminate the sheer amount of data that this new intelligence capability will generate. As an example the *Global Hawk* can remain airborne for over 24 hours, providing high resolution imagery from a variety of sensors and surveying an area the size of the state of Illinois.[28] Now imagine five *Global Hawk* orbits active simultaneously across the globe. They will collect a mind-boggling amount of information. And thus one of the great attributes of a UAS, persistence, also becomes a detriment when having to ensure the ability to analyze the information gathered. The USAF Chief of Staff, General T. Michael Moseley recently wrote

> ISR systems such as the MQ-1 and RQ-4 bring additional ISR capabilities, but with their increased persistence, range and numbers, they also present our intelligence professionals greater intelligence exploitation and analysis challenges that will be addressed through enhanced career force management.[29]

Is career force management really the answer or is it a matter of basic numbers? Will there be enough intelligence professionals to accomplish these increased mission requirements in 2020?

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[26] *QDR*, 57.
[27] Ibid., 56.
[28] Nicholas D. Evans, *Military Gadgets* (Upper Saddle River, NJ: Financial Times Prentice Hall, 2004), 38.
[29] General T. Micheal Moseley, *CSAF Vector: Transforming Air Force Intelligence, Surveillance, and Reconnaissance*, 29 January 2007, http://www.af.mil/library/viewpoints/csaf.asp?id=299.

Intelligence support for UA operations is by no means exclusively an USAF issue. The USA and USMC have enthusiastically embraced UAS and the capabilities they bring to the tactical commander on the ground. They, too, will require extensive intelligence support. "On battlefields of the future, UAVS will support all Army echelons, across the spectrum of conflict, on varied terrain and across the Battlefield Operating Systems."[30] The USA is planning on the Future Force employing an integrated family of UAS providing organic ISR capability from the squad leader and up. In addition to the organic ISR support, UAs will be accomplishing such missions as enabling precision fires, route reconnaissance, targeting support, and battle damage assessment.[31] By 2007, the USA is expecting to have at least 43 Brigade Combat Teams (BCTs) in the regular forces.[32] Each modular BCT is supported by at least 28 tactical UAs. With the fielding of the Future Combat System (FCS), the total UA requirement may reach 7000.[33] Is the indigenous intelligence capability within the US Army prepared to support such a large force of UAs?

Through reachback, the US Army is advocating a capability that provides

> dedicated, focused intelligence support to deployed tactical forces from fixed knowledge centers, providing precise, tailored information verses megabits of data. These new capabilities are significantly improving intelligence through the synchronization of advanced collaborative analysis to support combat operations in a full-spectrum environment.[34]

This sounds impressive, but is that support capable of reaching down to the squad and platoon level? More importantly, is the US Army preparing its squads and platoons to properly analyze and utilize the data that is being collected by the UAs that are in direct support of these basic

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[30] US Army, *2005 Army Modernization Plan*, (Washington DC: Department of the Army, February 2005), D-10.
[31] Ibid., D-12.
[32] Ibid., 5.
[33] Reinaldo J. Chavez, "The Role of Unmanned Aerial Vehicles (UAVs) in Providing Intelligence Support to 21st Century Military Operations," (master's thesis, USMC War College), 16.
[34] Army Modernization Plan, 31.

fighting units? Lieutenant General John F. Kimmons, the US Army G-2, states that each transformed BCT has "an assigned Military Intelligence company with organic HUMINT, UAV, SIGINT and analysis platoons."[35]

During OIF, combat units of the Marine Corps came to the realization that they did not have adequate amount of intelligence support for combat operations in a counter-insurgency environment. Some battalion commanders developed intelligence cells within their companies to enhance the available intelligence support. These cells were often comprised of bright young riflemen with no formal training.[36] As increasing numbers of UAS are rapidly added to the inventory, it is questionable whether the services will be able to adequately provide the intelligence support needed to fully utilize these systems.

As will be in the coming pages, the DoD has recognized that communications support for UAS operations has the potential to impact future operations. However, it is apparent that this type of recognition does not extend to intelligence support. Neither the Defense Science Board study on UAVs nor the DoD UAS Roadmap specifically mentions the need for enhanced intelligence analysis capability in order to properly exploit the increased amount of information the future UAS architecture will collect.

COMMUNICATIONS SUPPORT

> *Successful employment of military force in the future will require the optimum use of bandwidth. Now is the time to put the bandwidth tools and processes in place that will make victory a certainty.*
>
> *Lieutenant Colonel Kurt A. Klausner*[37]

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[35] LGEN John F. Kimmons, "Transforming Army Intelligence," *Military Review* LXXXVI, no. 6 (Nov-Dec 06), 69.
[36] Lt Col Willard A. Buhl, (USMC Command and Staff College, Quantico MCB, VA), interview by author 5 December 2006.
[37] Lt Col Kurt A. Klausner, "Command and Control of Air and Space Forces Requires Significant Attention to Bandwidth," *Air & Space Power Journal* 16, no. 4 (Winter 2002): 77, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj02/win02/win02.pdf.

Communications are a major subsystem of any UAS system and adequate bandwidth is a critical requirement for UAS operation. The term is often used in a broad sense to indicate a measure of communications capability. In the basic sense, bandwidth is the amount of data that can be transferred over a certain time period. Bandwidth is also often used to describe a channel's capacity. For example, a 66 MHz digital data bus with 32 separate data lines technically has a bandwidth of 66MHz and a capacity of 2.1 Gigabytes per second (Gbps). However, one should not be surprised to hear the bus being described as having a bandwidth of 2.1Gbps. In simplest terms, bandwidth is like a super highway with multiple lanes. Only a certain number of vehicles can operate on the road at normal speeds. Once the capacity of the road is exceeded, traffic starts to slow down. The same is true for bandwidth – only a finite amount of data can be transferred.

As the DoD has became more and more technologically focused, its appetite for satellite communications capability has become voracious. Individual service programs and concepts such network-centric warfare, Future Combat System, ForceNet, LandWarNET, reachback and distributed operations consume (or will consume when operational) large amounts of satellite capability. These needs are in addition to the "basic" requirements for UAS operations, command and control of military forces, radio voice communications, telephone, internet and email. During Operation DESERT STORM 99 Megabytes per second (Mbps) of capability supported 500,000 troops. Capacity had increased to 3.2Gbps in Operation IRAQI FREEDOM (OIF), yet this is still not adequate to meet the needs of the DoD. The US currently spends approximately $400 million per year to lease commercial satellite capability to cover its satellite communications shortfall.[38]

[38] Major Heath Collins (Air Force Space Command, Los Angeles Air Force Base, CA), interview by the author, 12 December 2006.

The USMC recognizes that even before the dramatic increase in UA operations that will occur within that service in the future, communications support is already inadequate. Brigadier General Joseph Dunford Jr., director of the Marine Corps operations division at the plans, policy and operations directorate stated "We could not push voice, data and imagery across the force at the appropriate levels to the degree necessary. Our capabilities and the equipment that we have out there in the operating forces are not what they need to be for the current fight." This shortfall will only be exacerbated when the USMC realizes the vision for UAS capabilities called for by Dunford. "We have to field unmanned air vehicles at every level in the Marine air ground task force," said Dunford, who added that UAVs are not fielded in the significant numbers that Marines need today.[39]

With the ongoing rapid increase in UAS inventories, there are two communications issues to consider. While the sheer numbers of UAs will require increased communications capability to operate, increases in the numbers and capabilities of the sensors on each platform will also tax existing bandwidth capability. The DSB recommended that the DoD "push technology to drive down the cost and weight, while maintaining performance, of all categories of sensors…"[40] However, when that argument is taken to a logical conclusion, problems emerge. Smaller, lighter sensors and higher performance platforms mean in the future each UAS will contain more sensors on every UA. Each of these sensors, as their respective capability to collect larger and more complex amounts of data increases, places a correspondingly larger strain on bandwidth to transmit that data for processing and dissemination. For example, in 2015 the *Global Hawk* and its suite of "multi-INT" sensors will have a data rate requirement of 548Mbps

[39] Grace Jean, "Marine Corps' Vision for the Future Requires More Training, Technology," *National Defense Magazine* January 2007, http://www.nationaldefensemagazine.org/issues/2007/January/MarineCorps.htm.
[40] DSB Study, xiii.

(for each *Global Hawk* operating).[41] Five *Global Hawks* would take up the equivalent of all the bandwidth utilized during OIF. Add to that the potential for 20+ *Predator* orbits (each using approximately 45Mbps) and bandwidth needs for just these two UASs would approach 4.0Gbps.[42]

How much capacity exists today to support the US need for satellite communications support? Current on orbit systems include the Defense Satellite Communications System III and the Military Strategic and Tactical Relay. Given that the US is currently buying commercial satellite capability, it is a safe assumption that the current systems cannot fill the DoD's total need for satellite communications. There are systems in development that can help mitigate the shortfall. The Wideband Global SATCOM is a five satellite constellation that is a follow-on to DSCS; its planned-for capacity is 2100Mbps loaded throughput. The first satellite will be launched in 2007 and operational in early 2008.[43] The Transformational Satellite Communications System is a next-generation system providing laser communications (tremendous increase in capability, but susceptible to weather interference). It is being designed specifically to support intelligence, surveillance and reconnaissance (ISR) assets and is also a five satellite system. Its non-laser loaded throughput is 2340Mbps and its laser capability is 4880Mbps (currently limited by the ground terminal capacity).[44] Will this be enough capability in 2020 to support literally thousands of operating UAs?

There are many organizations, to include DoD, that recognize the looming issue with communications. The GAO stated that "limits on bandwidth availability will hamper DOD's ability to obtain the benefits from these new weapons systems if bandwidth availability is not

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[41] Ibid., 23
[42] These numbers do not take into account the requirements of the family of Unmanned Combat Air Vehicles (UCAV) being developed that will also have large bandwidth requirements.
[43] Collins interview.
[44] All data in this paragraph is taken from the *Air Force Handbook, 2006*.

expanded."[45] In late 2006 the National Security Space Office conducted a broad look Analysis of Alternatives that specifically addressed communications shortfalls. While most of its conclusions and recommendations are classified, an Air Force officer who participated in the study stated that while the NSSO acknowledged that gaps in capability are happening, there are plans to mitigate these limitations.[46]

CONCLUSION

> *GAO's most recent report points out that while DOD has taken some positive steps, its approach to UAV planning still does not provide reasonable assurance that the significant Congressional investment in UAVs will result in their effective integration into the force structure.*
>
> *General Accounting Office*[47]

Without a doubt, UAS are a force multiplier and are here to stay. The capabilities they bring to the fight do, or have the potential to in the future, fully complement manned joint capabilities. However, it is apparent that the rapid rise in UAS employment as a result of the Global War on Terrorism and OIF / OEF caught the DoD unprepared. Multiple systems are being fielded by all the services and in some instances without thorough integration. The future is bright for UAS operations, however the DoD needs to be proactive (and to a large extent directive in nature when dealing with the individual services) to ensure that the potential capabilities (to include interoperability benefits) inherent in UAS are appropriately exploited and brought to fruition.

A robust communications infrastructure is absolutely vital to effective and efficient UAS operations in 2020 and beyond. With the lead time required for major weapon system procurement, it is not too early to start taking steps to ensure that future communications

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[45] GAO, *UAV: Improved Strategic and Acquisition Planning Can Help Address Emerging Challenges*, GAO-05-395T, (Washington DC: March 2005), 7.
[46] Collins interview.
[47] GAO, *Major Management Issues*, 1

requirements are foreseen, programmed and funded. This includes developing common standards for use in future UAS acquisition. This requirement is not limited to the DoD; with the increasing use of UAS in other government agencies such as the Department of Homeland Security, issues such as communications capacity will be increasing stressed. Moreover, DoD decision makers need to break out of the existing paradigms in the search for innovative solutions. Wireless tactical networks, airships, balloons and UAS all can provide communications relay capabilities that will reduce the strain on our orbital assets.

Intelligence support for UAS operations requires a thorough reevaluation. The Department of Defense, in close cooperation with the Director of National Intelligence, must thoroughly examine plans to support the exponential increases in data collection that will occur in the very near future. Two of our past so called "intelligence failures," Pearl Harbor and 9/11 could have been averted if resources and processes were in place to ensure timely analysis and dissemination of collected data to proper decision makers. The information was out there, we just didn't know we had it and could not put the pieces together. It would be unconscionable that happened again because we failed to ensure adequate resources were available for a foreseeable problem. Technology alone is not the answer. Credible intelligence analysis and dissemination will always require a robust human component, adequately trained, funded and supported.

The DoD faces difficult budget decisions in the coming years. It will not be surprising to see Congress pushing to spend less on defense as we leave Iraq in the coming years. A possible "peace dividend," combined with the daunting recapitalization issues each service faces, adds up to a very possible reality that Hobbesian decisions regarding budget priorities will have to be made. The DoD must ensure that as it goes forward with a dramatic increase in its UAS inventory, it takes the corresponding steps to ensure that these systems can be supported in the

years to come, specifically in the realms of intelligence and communication. If not, we will rapidly approach the time when we have an impressive fleet of UAs, but are unable to adequately employ them to their fullest potential.

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